CHAPTER 6. STREAM CHANNEL

Characterization

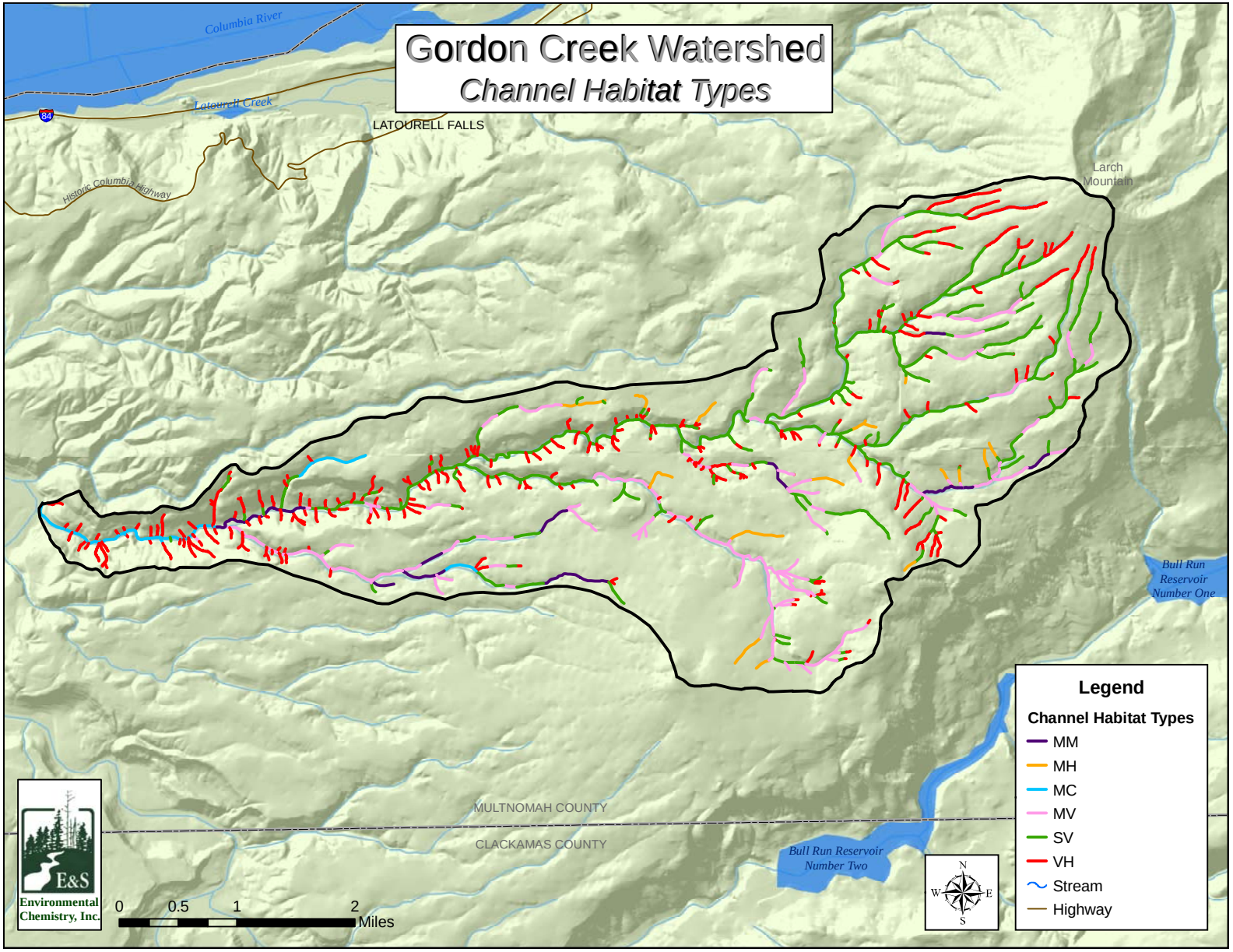
The physical conditions of the landscape create similar stream characteristics among streams of similar size and position in the stream network. Identifying groups of stream channels with similar characteristics can help to understand the opportunities and limitations for aquatic habitat. In this chapter we provide an analysis of stream Channel Habitat Types (CHTs) for the Gordon Creek Watershed based on physical properties of the stream network, including stream gradient, stream size, and lateral confinement of the stream channel. Classifying current CHTs in the watershed helps to (1) evaluate basin-wide stream channel conditions, (2) understand how land use activities may have affected the channel form, and (3) predict how different channels may respond to particular management and restoration activities (WPN 1999). Ultimately, changes in watershed processes will affect channel form and produce changes habitat for fish and aquatic species.

Current Conditions

There are six CHTs in the Gordon Creek watershed. Stream channels in the Gordon Creek Watershed are characteristically steep to moderately-steep (Map 6-1; Table 6-1). Steep conditions are most apparent at the edges of the stream network, such as along the headwater streams at the higher elevations of Larch Mountain, and along first-order tributary streams of Gordon Creek. Steep, confined CHTs include very steep headwater (VH) and steep narrow valley (SV) types. VH types account for 27.2 percent and SV account for 38.8 percent of streams in the watershed, respectively. These two types constitute the majority of stream length in the watershed. In the middle elevations of the watershed, moderately-steep channel types, such as moderately steep narrow valley (MV), moderate gradient moderately confined (MM), and moderate gradient headwater (MH) are common. These channel types together account for 12.2 percent of the stream network, and are found on medium-sized, second or third-order streams. The mainstem of Gordon Creek from the mouth to Cat Creek is moderate gradient confined (MC).

Reference Conditions

Information on historical stream channel conditions in the Gordon Creek Watershed was not available. Channel downcutting and incision is the most common change in streams in Oregon when compared to reference conditions. Downcutting and incision are frequently associated with land use activities historically absent in the Gordon Creek Watershed, such as intensive agricultural and livestock use, stream channel straightening, diking, and floodplain reclamation. Although large flood events that occurred in 1964 and 1996 may have been associated with some debris flows that scoured channels and re-distributed large woody debris, it is unlikely that physical stream channel conditions have been uniformly or substantially altered throughout the Gordon Creek Watershed as compared with reference conditions.



Map 6-1. Channel habitat types in the Gordon Creek Watershed. See Table 6-1 for code descriptions.

Table 6-1. Channel habitat types and their frequency of occurrence in the watershed.

CHT	Channel Habitat Type	Gradient (Percent)	Confinement	Miles	Percent
MC	Moderate Gradient, Confined	2 - 4	High	2.9	3.5
MH	Moderate Gradient Headwater	2 - 4	High	3.4	4.2
MM	Moderate Gradient, Moderately Confined	2 - 4	Moderate	3.7	4.5
MV	Moderately Steep, Narrow Valley	4 - 8	High	17.9	21.8
SV	Steep Narrow Valley	8 - 16	High	31.6	38.7
VH	Very Steep Headwater	>16	High	22.3	27.2
Total				81.8	100.0

Discussion

Channel responses to changes in ecosystem processes are strongly influenced by channel confinement and gradient (Naiman and Bilby 1998). For example, unconfined channels possess floodplains that mitigate peak flow effects and allow channel migration. In contrast, confined channels translate high flows into higher velocities. Ultimately, these characteristics control stream conditions such as bedload material, sediment transport, and fish habitat quality. Generally, more confined, higher gradient streams demonstrate little response to watershed disturbances and restoration efforts (Figure 6-1). By grouping the channels into geomorphologic types, we can determine which channels are most responsive to disturbances in the watershed as well as those channels most likely to respond to restoration activities. CHTs provide a means for assessing the spatial distribution of channel characteristics, and indicate where in the watershed habitat for different fish species is likely to be found.

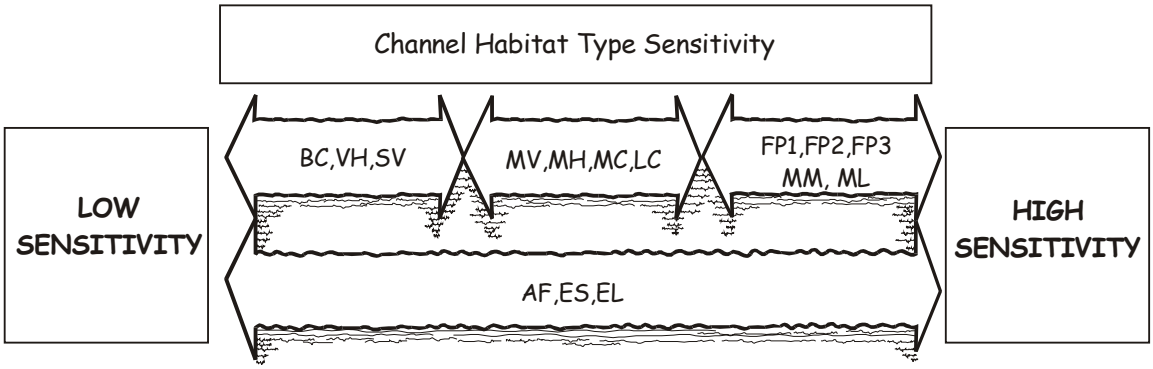


Figure 6-1. Channel habitat type sensitivity. Different channel types respond differently to adjustments in channel pattern, location, width, depth, sediment storage, and bed roughness. Such changes may not only result in alteration of aquatic habitat, but the more responsive areas are most likely to exhibit physical changes from land management activities and restoration efforts (WPN 1999). See Table 6-1 for names associated with the codes for CHTs found in the Gordon Creek Watershed.

However, channel sensitivity alone is not a sufficient indication that a stream section is suitable for riparian enhancement. Floodplain CHTs are highly responsive, but usually too unstable for successful riparian enhancement projects. Channel types that display a moderate degree of confinement are better candidates for restoration activities. CHTs such as MM are often the best sites for riparian enhancement. Moderately sensitive CHTs, such as MC, MH, and MV may not yield intended results from in-channel enhancement. On stream sections that are not forested, these channels may be incised and prone to bank erosion from livestock, and may benefit from livestock exclusion. SV and VH are usually too steep and are not suitable sites for enhancement projects.